KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

VM-400HDCP
1:4 DVI Distributor

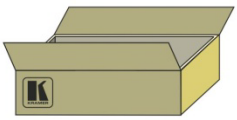
P/N: 2900-300054 Rev 1

VM-400HDCP Quick Start Guide

This page guides you through a basic installation and first-time use of your **VM-400HDCP**. For more detailed information see the **VM-400HDCP** user manual, the latest copy of which can be downloaded from http://www.kramerelectronics.com.

Step 1: Check what's in the box

- **VM-400HDCP** 1:4 DVI Distributor
- Power adapter (5V DC output)
- 4 Rubber feet
- 1 Quick start guide
- 1 User Manual



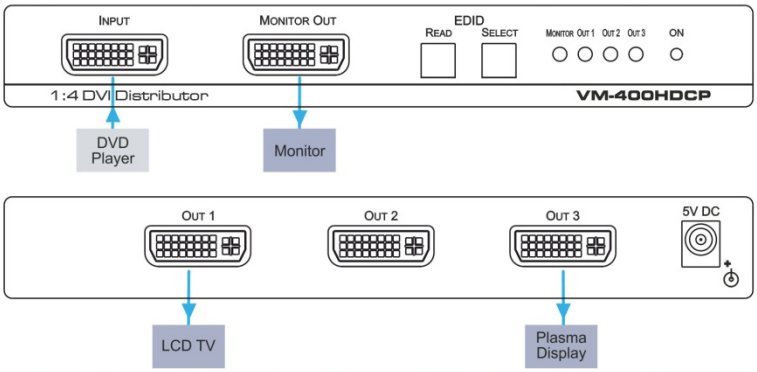
Save the original box and packaging materials in case your Kramer product needs to be returned to the factory for service.

Step 2: Install the VM-400HDCP

Mount the device in a rack (using the optional RK-2TB rack adapter) or place it on a shelf.

Step 3: Connect the input and outputs

Always switch off the power to all devices before connecting them to your **VM-400HDCP**.



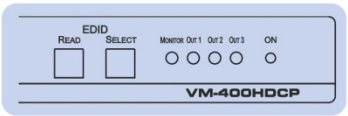
When connecting AV equipment to the **VM-400HDCP** we recommend that you always use Kramer high-performance cables for best results.

Step 4: Connect the power

Connect the power adapter to the **VM-400HDCP** and plug the adapter into the mains electricity.

Step 5: Optional—Set the EDID - see Section 6

Set the EDID using the front panel buttons



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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Products.

Congratulations on purchasing your Kramer MegaTOOLS® **VM-400HDCP** *1:4 DVI Distributor*, which is ideal for the following typical applications:

- Home theater, presentation and multimedia applications
- Rental and staging

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
  Use Kramer high performance, high resolution cables

Go to http://www.kramerelectronics.com to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **VM-400HDCP** *1:4 DVI Distributor* away from moisture, excessive sunlight and dust

Caution: No operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit

Warning: Disconnect the power and unplug the unit from the wall before installing

3 Overview

The high quality **VM-400HDCP** accepts an HDMI signal and distributes the selected signal to up to four outputs over DVI connectors.

The **VM-400HDCP** features:

- Support for up to 1.65Gbps bandwidth per graphic channel
- I-EDIDPro™ Kramer Intelligent EDID Processing™ – Intelligent EDID handling & processing algorithm ensures Plug and Play operation for DVI/HDMI systems
- Support for HDCP signals
- Equalization and reclocking of the data
- The ability to use a default EDID or acquire the EDID from one output or from all connected outputs (Auto-mix)
- A MegaTOOLS® sized enclosure. The device can be mounted in a rack using the optional **RK-T2B** adapter

3.1 About DVI–General Description

The Digital Visual Interface (DVI) is a video interface standard covering the transmission of video between a source device (such as a personal computer) and a display device. DVI is designed to carry uncompressed digital video data to a display. It is partially compatible with the HDMI (High-Definition Multimedia Interface) standard in digital mode (DVI-D), and VGA in analog mode (DVI-A).

A single-link DVI connection consists of four TMDS links; each link transmits data from the source to the device over 1 twisted wire pair. Three of the links correspond to the RGB components of the video signal: red, green, blue (for a total of 24 bits per pixel.) The fourth link carries the pixel clock. Each TMDS link carries binary data at ten times the pixel clock reference frequency, for a maximum data rate of 1.65Gbps × 3 data pairs for single-link DVI.

The DVI specification mandates a maximum pixel clock frequency of 165MHz when running in single-link mode. With a single DVI link, the highest supported

standard resolution is 2.75 megapixels (including blanking interval) at 60Hz refresh. For practical purposes, this allows a maximum screen resolution at 60Hz of 1,915×1,436 pixels (standard 4:3 ratio), 1,854×1,483 pixels (5:4 ratio), or 2,098×1,311 (widescreen 16:10 ratio). A dual link doubles the number of TMDS pairs, effectively doubling video bandwidth at a given pixel clock frequency.

The maximum length of DVI cables is not included in the specification since it is dependent on the video resolution and refresh rate. In general, cable lengths up to 4.5m (15ft) will work for displays at resolutions of 1,920×1,200. This resolution will work even up to 10m (33ft) if appropriate cable is used. Cable lengths up to 15m (50ft) can be used with displays at resolutions up to 1,280×1,024. For longer distances, the use of a DVI booster is recommended to mitigate signal degradation. DVI boosters may use an external power supply.

3.2 About HDCP

The High-Bandwidth Digital Content Protection (HDCP) standard developed by Intel protects digital video and audio signals transmitted over DVI or HDMI connections between two HDCP-enabled devices to eliminate the reproduction of copyrighted material. To protect copyright holders (such as movie studios) from having their programs copied and shared, the HDCP standard provides for the secure and encrypted transmission of digital signals.

3.3 Defining EDID

The Extended Display Identification Data (EDID) is a data-structure provided by a display, to describe its capabilities to a graphics card (that is connected to the display's source). The EDID enables the **VM-400HDCP** to "know" what kind of monitor is connected to the output. The EDID includes the manufacturer's name, the product type, the timing data supported by the display, the display size, luminance data and (for digital displays only) the pixel mapping data.
EDID is defined by a standard published by the Video Electronics Standards Association (VESA).

4 Defining the VM-400HDCP 1:4 DVI Distributor

Figure 1 defines the front panel of the **VM-400HDCP**.

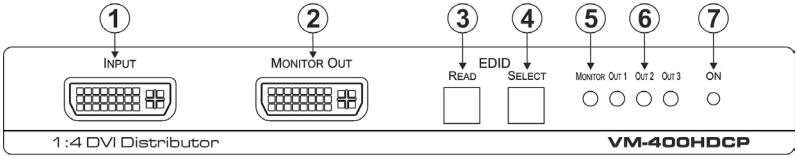

Figure 1: VM-400HDCP 1:4 DVI Distributor Front Panel

#	Feature		Function
1	*INPUT* DVI Connector		Connect to a DVI source
2	*MONITOR OUT* DVI Loop Connector		Connect to a DVI acceptor for input monitoring
3	*EDID*	*READ* Button	Press to acquire the EDID following selecting the EDID source. Press again to indicate the EDID status (see Section 6) Lights when configuring the EDID
4		*SELECT* Button	Press to select the EDID source (single output, Auto-Mix or default), see Section 6 Lights when configuring the EDID
5	*MONITOR* LED		Lights green when an output is connected to the Monitor Out connector and is active. The LED flashes to indicate the source of the EDID acquired (see Section 6) or when connecting a non HDCP display while providing HDCP content to the **VM-400HDCP**
6	*OUT1, OUT 2, OUT 3* LEDs		Lights green when an output is connected and is active. The LED flashes to indicate the source of the EDID acquired (see Section 6) or when connecting a non HDCP display while providing HDCP content to the **VM-400HDCP**
7	*ON* LED		Lights green when the device receives power

Figure 2 defines the rear panel of the **VM-400HDCP**.

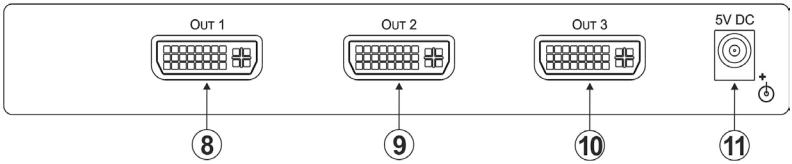

Figure 2: VM-400HDCP 1:4 DVI Distributor Rear Panel

#	Feature	Function
8	*OUT 1* DVI Connector	Connect to a DVI acceptor
9	*OUT 2* DVI Connector	Connect to a DVI acceptor
10	*OUT 3* DVI Connector	Connect to a DVI acceptor
11	*5V DC* Connector	Connect to the power adapter, center pin positive

5 Connecting the VM-400HDCP

Always switch off the power to any device before connecting it to your **VM-400HDCP**. After connecting your **VM-400HDCP**, connect its power and then switch on the power to the other devices.

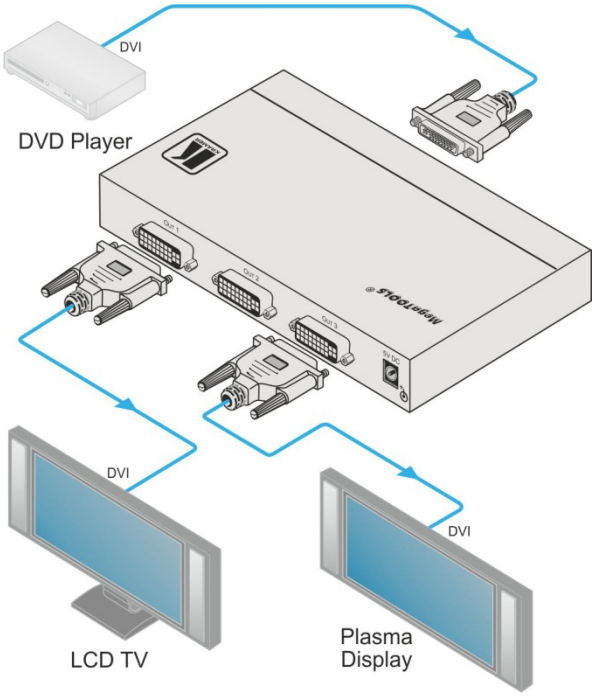

Figure 3: Connecting the VM-400HDCP 1:4 DVI Distributor

To connect the VM-400HDCP as illustrated in the example in Figure 3:

1. Connect the DVI source (for example, a DVD player) to the DVI Input connector on the front panel.

2. Connect the DVI outputs and loop monitor to up to four DVI acceptors (for example, an LCD TV and a plasma display).

3. Connect the power adapter to the **VM-400HDCP** and to the mains electricity (not shown in Figure 3).

6 Acquiring the EDID

Each input on the **VM-400HDCP** has a factory default EDID loaded (see Section 8). This lets you connect the power before having to connect one of the acceptors.

The factory-default is the EDID which is programmed into the VM-400HDCP before being shipped.

The EDID can be acquired from:

This is usually done only once when the machine is being set up in an installation. Once acquired, the EDID is saved in non-volatile memory and further acquisition is not necessary.

- One output
- The default EDID
- Up to four connected outputs using the Auto-mix Mode

  The EDID acquired is a weighted average of all the connected outputs. For example, if several displays with different resolutions are connected to the outputs, the acquired EDID supports all the resolutions, as well as other parameters included in the EDID.

Repeatedly pressing the EDID SELECT button cycles through the EDID sources in the following order:

If you attempt to acquire the EDID from an output that is not connected the default EDID is acquired.

- Monitor (Monitor LED flashes)
- Output 1 (Output 1 LED flashes)
- Output 2 (Output 2 LED flashes)
- Output 3 (Output 3 LED flashes)
- Default EDID (all LEDs flash)
- Auto-Mix EDID (all LEDs light)

To store the selected EDID, press EDID READ as described in the following example.

To cancel the EDID modification wait for a few seconds without touching any button.

To acquire the EDID from Output 3:

1. Press the EDID SELECT button repeatedly until OUTPUT 3 LED flashes.

2. Press and hold the EDID READ button until the LED stops flashing.
   The EDID from Output 3 is now stored at the input.
   Pressing the EDID SELECT button briefly once causes the relevant LEDs to indicate which EDID is stored at the input as follows:

   - The MONITOR LED flashes—the EDID from MONITOR was the last acquired
   - OUTPUT 1 LED flashes—the EDID from OUTPUT 1 was the last acquired
   - OUTPUT 2 LED flashes—the EDID from OUTPUT 2 was the last acquired, and so on
   - All OUTPUT LEDs flash—the default EDID was the last acquired
   - All OUTPUT LEDs light—the Auto-Mix EDID was the last acquired

     The EDID acquired is a weighted average of all the connected outputs. For example, if several displays with different resolutions are connected to the outputs, the acquired EDID supports all the resolutions, as well as other parameters included in the EDID.

7 Technical Specifications

INPUT:	1 DVI connector
OUTPUTS:	4 DVI connectors
BANDWIDTH:	Supports up to 1.65Gbps bandwidth per graphic channel
COMPLIANCE WITH HDCP STANDARD:	Supports HDCP
INDICATOR LEDs:	POWER, OUTPUT
POWER SOURCE:	5V DC, 1.2A
OPERATING TEMPERATURE:	0° to +55°C (32° to 131°F)
STORAGE TEMPERATURE:	-45° to +72°C (-49° to 162°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS:	18.8cm x 11.27cm x 2.57cm (7.4" x 4.44" x 1.01") W, D, H
WEIGHT:	0.42kg (093.lbs) approx.
ACCESSORIES:	Power supply
OPTIONS:	RK-T2B 19" rack adapter
Specifications are subject to change without notice at http://www.kramerelectronics.com	

8 Default EDID

Monitor
Model name..... VM400HDCP
Manufacturer..... KRM
Plug and Play ID..... KRM0400
Serial number..... 505-707455010
Manufacture date..... 2009, ISO week 10
Filter driver..... None

EDID revision..... 1.3
Input signal type..... Digital
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 520 x 320 mm (24.0 in)
Power management..... Standby, Suspend, Active off/sleep
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... n/a

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.674 - Ry 0.319
Green chromaticity..... Gx 0.188 - Gy 0.706
Blue chromaticity..... Bx 0.148 - By 0.064
White point (default).... Wx 0.313 - Wy 0.329
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 30-83kHz
Vertical scan range..... 56-76Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x720p at 60Hz (16:10)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
640 x 480p at 60Hz - IBM VGA
640 x 480p at 75Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 75Hz - VESA
1024 x 768p at 60Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1280 x 1024p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD
1152 x 864p at 75Hz - VESA STD

EIA/CEA-861 Information
Revision number..... 3
IT underscan..... Supported
Basic audio..... Supported
YCbCr 4:4:4..... Supported
YCbCr 4:2:2..... Supported
Native formats..... 1
Detailed timing #1..... 1920x1080p at 60Hz (16:10)
Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:10)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1280x720p at 60Hz (16:10)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #4..... 720x480p at 60Hz (16:10)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync

CE video identifiers (VICs) - timing/formats supported
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
720 x 480p at 60Hz - EDTV (16:9, 32:27)
720 x 480p at 60Hz - EDTV (4:3, 8:9)
720 x 480i at 60Hz - Doublescan (16:9, 32:27)
720 x 576i at 50Hz - Doublescan (16:9, 64:45)
640 x 480p at 60Hz - Default (4:3, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 2-channel, 16/20/24 bit depths at 32/44/48 kHz

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

CE speaker allocation data
Channel configuration.... 2.0
Front left/right..... Yes
Front LFE..... No
Front center..... No
Rear left/right..... No
Rear center..... No
Front left/right center.. No
Rear left/right center... No
Rear LFE..... No

Report information
Date generated..... 19-Jan-12
Software revision..... 2.60.0.972
Data source..... File
Operating system..... 5.1.2600.2.Service Pack 3

Raw data
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LIMITED WARRANTY

We warrant this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by us or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081: "Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"

EN-50082: "Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".

CFR-47: FCC* Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

  * FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site where updates to this user manual may be found.

We welcome your questions, comments, and feedback.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com

SAFETY WARNING
Disconnect the unit from the power supply before opening and servicing